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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,042	04/08/2004	Thomas C. Tiearney JR.	GEMS0239PA	3041

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EXAMINER
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KIKNADZE, IRAKLI

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 06/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/709,042	<b>Applicant(s)</b> TIEARNEY ET AL.	
	<b>Examiner</b> Irakli Kiknadze	<b>Art Unit</b> 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 25-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-16 and 25-27 is/are rejected.
- 7) ☒ Claim(s) 3 and 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

1. In response to the Office action dated March 17, 2006 the Amendment has been received on May 3, 2006.

Claims 1-16 and 25-28 are currently pending in this application.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2, 8, 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 2 recites the limitation "a lightweight material" that renders claim indefinite since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

5. Claim 8 recites the limitation "the substrate surface" in line 2. There is insufficient antecedent basis for this limitation in the claim.

6. Claim 14 recites limitation "may be" on line 5. A broad range or limitation followed by linking term may be is considered indefinite since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Claim 15 is rejected by virtue of its dependence.

***Claim Rejections - 35 USC § 102***

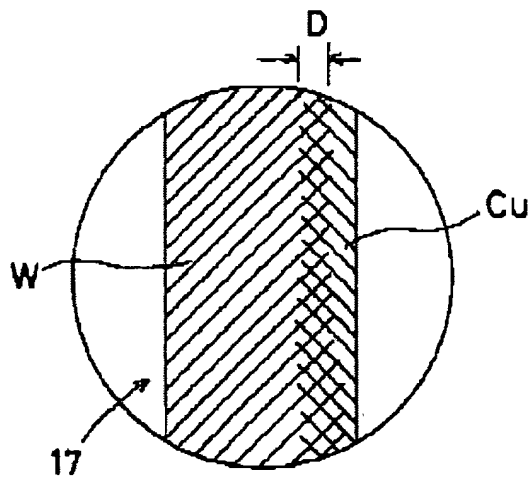
7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 2, 4, 7, 8, 10 and 25-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Shiratori (JP 05266838 A).

With respect to claim 1, Shiratori teaches an x-ray anode (Fig.3) comprising:



a substrate material (Cu);

a target material (W); and one or more graded CTE material layers (D) coupling the substrate material (Cu) to the target material (W) (see abstract and constitution).

With respect to claim 2, Shiratori teaches that the substrate is a lightweight metal material (see abstract).

With respect to claim 4, Shiratori teaches that the target material (W) is tungsten a refractory metal.

With respect to claim 7, Shiratori teaches that the each of the one of more graded CTE material layers are layered sequentially from the substrate material (Fig. 3, see abstract).

With respect to claim 8, Shiratori teaches that the one or more graded CTE material layers are layered horizontally from the substrate material (Fig. 3, see abstract).

With respect to claim 10, Shiratori teaches that the graded CTE material layers made of "a functionally gradient material with the inner surface portion made of the same material as a target and the outer surface portion made of copper, with the metal contents gradually varied" (see abstract) so inherently the graded CTE material layers would have a different coefficient of thermal expansion.

With respect to claim 25, Shiratori teaches an x-ray anode (Fig.3) comprising: a substrate material (Cu); a target material (W); and one or more graded CTE material stratum (D) coupling the substrate material (Cu) to the target material (W) (see abstract).

With respect to claim 26, Shiratori teaches that the graded CTE material stratum (D) has a determined coefficient of thermal expansion thereby providing CTE strata between the substrate material (Cu) and the target material (W) (see abstract).

With respect to claim 27, Shiratori teaches (Fig.3) an x-ray anode comprising:  
one CTE material layer (D);

a substrate material (Cu) having a target location forming one layer of the graded CTE material layer; and

a target material (W) deposited upon the graded CTE material layer (D), wherein the graded CTE material layers, the substrate material and the target material are bonded (See abstract).

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiratori (JP 05266838 A) as applied to claim 1 above, and further in view of Horner et al. (US Paten Application Publication 2003/0006269 A1).

With respect to claims 5 and 6, Shiratori teaches that the target material is tungsten but fails to teach tungsten alloy or molybdenum alloy. Horner teaches an x-ray anode comprising refractory metal such as tungsten, tungsten alloys, molybdenum or molybdenum alloys ([0001]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ tungsten alloys or molybdenum alloys for the target material in the x-ray anode of Shiratoni, since it has been held to be within

the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use.

11. Claim 9, 11-13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiratori (JP 05266838 A).

With respect to claim 9, Shiratori teaches that the graded CTE material layers made of "a functionally gradient material with the inner surface portion made of the same material as a target and the outer surface portion made of copper, with the metal contents gradually varied" (See abstract) but is silent about the CTE material layer having an approximate coefficient of thermal expansion averaging between each of the adjacent materials. It would have been obvious to one of ordinary skill in art at the time the invention was made to use the CTE material having the approximate coefficient of thermal expansion averaging between each of the adjacent materials in the x-ray anode of Shiratori, since such a modification would gradually relieve the thermal expansion mismatch stress between the anode substrate (Cu) and refractory metal (W) of the target.

With respect to claims 11-13, Shiratori teaches that the graded material layer has a different coefficient of thermal expansion but fails to teach that differing coefficient of thermal expansion is  $2 \times 10^{-6}/^{\circ}\text{C}$  or  $1 \times 10^{-6}/^{\circ}\text{C}$  or less than  $1 \times 10^{-6}/^{\circ}\text{C}$ . A layer of a graded material comprising a mixture of particles of a refractory metal provides a layer with the graded coefficient of thermal expansion to form an intermediate barrier relieving the thermal expansion mismatch stress between the anode substrate and refractory metal of a focal track of the target. It would have been obvious to one of ordinary skill in art at

Art Unit: 2882

the time the invention was made to employ the CTE material layer having the specific differing coefficient of thermal expansion, such as  $2 \times 10^{-6}/^{\circ}\text{C}$  or  $1 \times 10^{-6}/^{\circ}\text{C}$  or less than  $1 \times 10^{-6}/^{\circ}\text{C}$ , as claimed in claims 11-13, to accommodate specific anode substrate/target material arrangement that gradually relieves the thermal expansion mismatch stress between the anode substrate and refractory metal of a focal track of the target. Furthermore, it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

With respect to claim 16, Shiratori teaches claimed invention except that the x-ray anode is a rotation x-ray anode. It is well known in the x-ray art that rotating anode x-ray tubes are used in mammography, vascular, and computed tomography x-ray system systems. It would have been obvious to one of the ordinary skill in art at the time the invention was made to substitute a stationary anode arrangement with a rotating anode arrangement in the apparatus of Shiratori, since such a modification would provide user with capabilities to provide mammography, vascular, and computed tomography x-ray imaging.

### ***Allowable Subject Matter***

12. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.



Art Unit: 2882

13. Claims 14 and 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

14. Claim 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claim 3, prior art fails to teach or make obvious an x-ray anode, wherein a substrate material is a carbon-fiber material including all of the limitations of the base claim and any intervening claims.

With respect to claims 14 and 15, prior art fails to teach or make obvious an x-ray anode, wherein varying a coefficient of thermal expansion of the one or more graded CTE material layers is achieved by altering the proportions of the carbon fiber material including all of the limitations of the base claim and any intervening claims.

With respect to claim 28, prior art fails to teach or make obvious an X-ray anode comprising one or more graded CTE material having different CTE determined by the percentage of carbon in a slurry mixture as claimed including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

16. Applicant's arguments with respect to claims 1-16 and 25-27 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Upadhya et al. (US Patent 4,972,449), Kaplan et al. (US Patent 3,887,723), Penato (US Patents 4,571,286; 5,125,020 and 5,138,645), Virshup et al. (US Patent 5,825,848) and Truskovska (US Patent 5,875,228) teach the x-ray anodes comprising one or more layers coupling with the substrate materials.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irakli Kiknadze whose telephone number is 571-272-2493. The examiner can normally be reached on 9:00-5:30.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2882

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Irakli Kiknadze  
June 5, 2006

*IK*

  
EDWARD J. GLICK  
SUPERVISORY PATENT EXAMINER